PART I.

Present Position and Prospects of the Royal Philosophical Society of Glasgow.

PART II.

Bishop Berkeley and his New Theory of Vision.

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Part I.—*Present Position and Prospects of the Royal Philosophical Society of Glasgow.*

Gentlemen,—When you did me the honour to elect me to the Presidentship of this Society I felt that you had relieved me of a considerable burden. After all, the success or failure of any Society depends perhaps more on its Secretary than on any of its other officials. For eleven years I discharged, in some fashion, the duties of the Honorary Secretaryship, and I think it right here and now to say that any success which attended my efforts on behalf of the Society was largely due to the zeal, to the efficiency, and to the intelligence with which the duties of the Acting Secretary were discharged by Mr Angus M'Lean now Principal of the Technical College, Paisley, and more recently by our esteemed friend Professor Peter Bennett. When I took up the Honorary Secretaryship it was merely as a stop-gap, an arrangement to last for only a few months, a post which I was willing to fill for a short time as a sort of act of filial piety, for I remembered with gratitude how singularly this Society had honoured and trusted my late father. Little did I realise that for 11 years I would be actively engaged as Honorary Secretary in the administration of its affairs, and that, with a generosity of which I confess I am not worthy, you would reward my labours by electing me your President.

Some of the recollections of my early boyhood are connected with this Society. So far back as the year 1871 I attended its meetings, for at that time my father took an active part in its affairs, and after school hours I was often employed in carrying along books and manuscripts and various munitions of war to help him in the fray. I remember well in these days Sir William Thomson and Professor Grant as Presidents, and Mr William Keddie as Secretary. The few members of the Society who have been connected with it long enough to remember Mr Keddie will, I am sure, agree with me when I say that it is almost impossible

to imagine any one better fitted for the post than he. A most modest and retiring man, in his own line of life he was profoundly erudite, and he was held in high esteem by all who had the privilege to know him. It is no easy task to occupy the Chair of a Society which has such an honourable history and such traditions, nor is the burden lessoned by the thought that this year we reach another important epoch in the Society's career. We have come, as it were, to the parting of the ways. We now no longer occupy premises conjointly with our friends the Society of Engineers and Shipbuilders in Scotland, and henceforward new responsibilities, chiefly financial, will have to be undertaken by the Society, which I trust it will be well able to meet. I sincerely hope that the future of the Society will be as prosperous and as successful as the past, and that it will continue, for many years to come, to do useful work in the city of Glasgow. That, however, depends upon the members of the Society, upon their co-operation with those whom they appoint from time to time to its board of management, but I feel sure that if there is a hearty and cordial effort made generally by the members to promote the great ends for which it exists that there will be an advance and not a retrogression.

Undoubtedly there have been considerable changes, even within my own recollection. These were perhaps inevitable, but they have considerably altered the character of the Society, and changed its scope of operations. It was called into being for the study of the mathematical and physical sciences, and for the study of the practical application of physics and chemistry to the arts and manufactures. It had a definite aim and that was, the propogation of technical knowledge amongst its members. It was for many a day, in a very special sense, the meeting place where men of scholarship in these departments of knowledge were brought into contact with their practical brethren. In recent years the scope of the Society's work has been much expanded. Technical societies have grown up all round. In the old days if a man discovered something new in mechanics, the science of machines, there was practically no other place at which he could exhibit his invention in Glasgow than at one of our meetings. In the same way, if an industrious man had invented some new process in dyeing or in bleaching the likelihood was that he would also communicate it to the Philosophical Society. It was, in these days, a

Society consisting almost entirely of members who worked and who brought the results of their researches before the notice of their fellow members. The growth of technical societies has somewhat deprived us of such contributions, and that, personally, I very much regret. It ought still to be a place where communications are made in all departments of scientific knowledge by workers. It should, in a very special manner, be the place where gentlemen engaged in various departments of scientific work should meet each other and interchange their views, and, further, it ought to be the point of contact between the scholars and students of our city and the ordinary every-day man in the street. I, for one, see no reason why a great deal of work done in Glasgow should be communicated to the scientific world in other towns, unless it be that there is a prevalent idea that technical scientific communications are no longer acceptable at the Royal Philosophical Society of Glasgow. If that idea exist it is a totally erroneous one, for the reception of such communications is still, to me, one of the chief objects for which this Society exists. In past years the community of Glasgow has derived much advantage from the frequency with which members of the staff of the University and of the staff of the old Andersonian made contributions to our *Proceedings*. I earnestly trust that as in the past, so in the future, the gentlemen who are connected with the learned institutions of the city will take a keen interest in our work, and will communicate to us from their stores of knowledge. Personally, I do not view altogether favourably the modern tendency, a tendency against which I ineffectively struggled for the 11 years during which I held the office of Secretary, to turn the Society into an institution chiefly for the hearing of lectures. To my mind a lecture Society is not one of very great or essential benefit to its members. No doubt, in the audience at a popular lecture, there may be some whose intellectual life is awakened, to whom new thoughts are suggested, and to whom new vistas are opened up; but not infrequently those who attend popular lectures simply have their ears tickled by matters which to them are new and of passing interest, but which exercise no permanent incentive to work, and which generally are entirely forgotten shortly after the delivery of the lecture. Personally I would like to see this Society much more used for short practical communications than it has been for some time.

I am well aware that technical work now-a-days must very largely go to technical societies. I have no wish to take a limited view of the matter. Undoubtedly it has strengthened our Society enormously to have such sections as the Historical and Philological section and the Economic Science section. Much valuable work has been done in both of these, and at their meetings gentlemen with expert knowledge have freely contributed their information to those engaged in similar studies. A Society like ours must be whatever its members make it, and I trust that even a larger number of its members will take part in our proceedings than in past years.

Three or four short communications every evening of a practical and original kind would, I think, be of great value to the members.

The reading *in extenso* of long papers taking from an hour to an hour and a half to communicate seems to me to be for the most part a mistake. At the same time if a member has brought together a large amount of valuable information on a subject on which he can speak authoritatively, I for one, would be very loth in any way to muzzle him or to prevent the Society deriving full benefit from his labours. A communication dealing exhaustively, although not exhaustingly, with a subject can quite well be printed in full, although only communicated in summary. No hard and fast line can be laid down, and perhaps it is better that authors be left very much to their own discretion in a matter of this kind.

At one period I hoped that there might be a union of incorporation between the Royal Philosophical Society and some of the others such as the Geological and the Natural History Societies, so that there might be one great and strong centre of scientific work in the city of Glasgow. If it can be shown that in this particular case union would make strength then the idea might be reasonably entertained. As matters stand at present, there is a certain amount of over-lapping. The members of one Society do not know what those of the others are doing, and even in such a matter as the formation of Libraries, copies of the same book are often to be found in the Library of each of these Societies, all housed in the same building.

Were some scheme of union possible it might strengthen materially the position of scientific research in our community. At the same time, were such a union in any way to interfere with or

prejudice the excellent work which has been done by such societies as those I have mentioned, it would simply be a disaster. They have done admirably in their own departments, and any limitation of their usefulness is much to be deprecated. Before I conclude this part of my address, may I say that we wish the Society of Engineers and Shipbuilders in Scotland all possible success in their new undertaking. Glasgow and the Clyde Valley is in a very special manner the calf country of marine engineering, and such an Association should be, and no doubt is, one of the most important in the world alike in the scientific work which it produces and in the strength of its membership. We rejoice at their success and we wish them all prosperity.

Part II.—*Bishop Berkeley and his New Theory of Vision.*

The theory of vision is a subject which has attracted the attention of the learned from time immemorial. Thus, to go no farther back, we find that Isaac Newton wrote on the subject, so also did Descartes, Thomas Young, Clarke Maxwell. In more recent times, Helmholtz has contributed two volumes of considerable size on the subject which must for many generations be accounted a classical work. No doubt some of the views enunciated by him have been slightly modified, yet certainly he, more than anyone else, established modern theories as regards the refraction of the eye and as regards the function of accommodation. The scientific side of all modern ophthalmic practice, in so far as it concerns physical notions, is at this moment based almost entirely on the work of Helmholtz. He it was who massed together the scattered fragments of less illustrious workers, pieced them together, and has added to the structure the products of his own transcendent genius. The theory of vision is essentially connected with the study of light, and so it is not surprising that physicists in all generations have been occupied with the investigation of luminous sensations. Metaphysicians, too, have had their say on the matter, and recently, being the happy possessor of a little leisure, I looked up and read Berkeley's Theory of Vision.

George Berkeley, Bishop of Cloyne, is I fear only known to the present generation as a somewhat ridiculous person belonging to

the first half of the eighteenth century, who enunciated and maintained a theory that matter does not exist, and that all states of consciousness are merely the expression of mental conditions. He was born in the year 1684, was admitted a Fellow of Trinity, Dublin, in 1707, and published his Theory of Vision in 1709. I do not intend to say anything as regards his life and other labours which included the invention of a new remedy in the shape of tar water; numerous diatribes against the mathematicians, particularly against the theory of fluxions; and efforts to propagate Christianity amongst the inhabitants of the West Indies. I only intend to review shortly his theory of vision and to contrast it with more recent researches. Ample justice has been done to Berkeley by so learned and great an author as Huxley. He makes him the subject of one of his most charming essays. From many points of view the essay referred to is well worth reading. It gives an interesting glimpse of the great Bishop, and affords many important sidelights on the attitude of mind towards certain metaphysical problems of a man who was one of the greatest biologists of our time.

From Huxley's essay, and from other sources, we learn that the worthy Bishop of Cloyne was promised pecuniary assistance for his missionary projects by Walpole, at that time British Prime Minister. Huxley is all but lost in admiration at the force of character of anyone who could get money out of Walpole for any scheme which was neither business nor bribery.

In his first paragraph Berkeley defines the limits of his investigations. He says: "My design is to show the manner wherein we perceive by sight the distance, magnitude and situation of objects, also to consider the difference there is between the ideas of sight and touch and whether there be any idea common to both senses, in treating of all of which it seems to me the writers of optics have proceeded on wrong principles." From the foregoing it is obvious that the author only attempted to investigate a limited portion of the function of vision. Distance, magnitude and situation or alignment are three of the most important functions of vision, but they are by no means all. Colour is also a visual sensation, and so is that perception to which particularly the name visual acuteness is applied. There is no function of vision of equal importance with that of visual acuteness; without it reading and writing would be impossible, and consequently, were it not

for its special power, human energies would be enormously curtailed. We shall have a good deal to say about visual acuteness before the end of this communication.

The estimation of distance is accounted for by Bishop Berkeley by the distinctness of the image. He entirely scouts all the reasonings of geometric optics. Thus we find him declaring that the lines and angles by which mathematicians pretend to explain the perception of distance are themselves not perceived or even thought of in the act of vision; and again that the distance of an object is not consciously estimated by the highness of an angle made by the meeting of the two optic axes, nor indeed by the greater or less divergency of the rays which arrive from every point to the observer's pupil. Even the act of turning the eyes does not seem to him to have much to do with the question. No doubt to some extent Berkeley admits that the estimation of the position of objects in space depends upon the rotation of the eyeballs from one point to the other; but what to him seems a certain explanation is the greater or less clearness with which the object is perceived. He states quite definitely that the nearer an object is brought the more confused it appears, which probably only shows that the learned and pious Bishop had that form of refractive error which is known as hypermetropia. The clearer an object the more remote he estimated it; the more difficulty he had in seeing it the nearer he judged it to be. Had the worthy Bishop only been shortsighted he would have come quite to the opposite conclusion, that the more confused the image was, the farther the object was situated from the person who saw it.

Yet, notwithstanding this attitude of mind, in paragraph 38 of his treatise he admits that there may be good use of computation by lines and angles in optics, "not that the mind judgeth of distance immediately by them, but because it judgeth by somewhat which is connected with them." Had Berkeley lived after Helmholtz instead of long prior to him he would have realized that this somewhat of which he speaks is nothing less nor more than the function of accommodation. The estimation of distance depends upon various factors, and probably differs according as whether the person who estimates is posessed of two useful eyes or only one. Let it be granted that the individual has two eyes available for distinct vision. There are at least three factors which help him to estimate distance. These three are Accom-

modation, Convergence, and what I may here call relative size Helmholtz was, unquestionably, the first man to give us a clear account of the mechanism of accommodation.

More recently Professor Tscherning, of Paris, has also written important papers on the subject. It is not possible in a short communication such as this, and perhaps not desirable to attempt in detail a discussion of the theory of Helmholtz as opposed to that of Tscherning, although I personally hold with the former; but it may be remarked that both are agreed as to the function of accommodation being brought about by a change in the curvature of the crystalline lens. The nearer the object, the stronger must be the lens which gives a clear image on a screen at a definite distance from the lens. In the human eye it is not dossible to take out one lens and put in another, but, in early life, the change is brought about by the alteration of the curvature of the lens surface. It becomes more curved the nearer the object is brought. It is agreed on all hands that this change of curvature is brought about by muscular action. Thus, one feature in helping a person to estimate distance is the unconscious perception of this muscular effort; in other words, the muscular sense helps us to estimate distance, or, at any rate, to know that one object is nearer than another.

But the second factor is perhaps equally important. Accommodation rapidly goes with advancing years, and at and after 60 it cannot be said to be present. The nearer the object viewed, the greater the angle of convergence; the further away, the less the convergence, and when the object is very far away the visual axes are practically parallel to each other. The two human eyes are, in this respect, not unlike the totally reflecting prisms of that ingenious instrument, Barr & Stroud's range finder. If I am not mistaken, the estimation of distance in that admirable piece of apparatus depends upon movements of these prisms. The estimation of distance by human beings depends largely upon the angle of convergence made by the two eyes. Probably another function of binocular vision is parallax or something like stereoscopic vision. Under ordinary circumstances, and using the eyes without any artificial help, the stereoscopic element is not strongly developed, but unquestionably, with two eyes, we perceive better the relative distance of objects than we do when only one is used. Binocular vision has absolutely nothing to do with a sense of

alignment, it has to do with the estimation of relative distance. Consequently, a man with only one eye is able for almost any kind of manual employment for that depends largely upon the alignment.

As regards number three, relative size, it is not so definite, but a person has, say, an idea of the average size of a man or of a two story house. Now, if he analyzes his sensations he will find that the farther a two story house is from him, the smaller does it appear, its apparent size being a function of the size of the image on his retina, and this decrease of the image is probably a not unimportant factor in helping the individual to estimate distance.

When a man has only one eye such information as is obtained in binocular fixation from convergence is entirely lost, but up till a certain time of life the individual has, no doubt, the power of accommodating, and the loss of one eye does not interefere in the least with the sense of alignment nor with this function of relative size.

Nor is the worthy Bishop more successful in the explanation which he gives of the estimation of the size of various objects. He denies entirely that it is by the estimation of angles, although he admits that an object at a near distance subtends a greater angle than when more remote. His views on this important matter are well expressed in the 56, 57 and 61 paragraphs of his Essay. I trust I am doing no injustice to the learned author when I quote only the 57th, for it seems to me tolerably well to summarise the other two.

"Moreover the judgments we make of greatness do in like manner, as those of distance, depend upon the disposition of the eye; also on the figure, number, and situation of objects, and other circumstances that have been observed to attend great or small tangible magnitudes. Thus, for instance, the very same quantity of visible extension, which in the figure of a tower doth suggest the idea of great magnitude shall, in the figure of a man, suggest the idea of much smaller magnitude. That this is owing to the experience we have had of the usual bigness of a tower and a man, no one, I suppose, need be told." Oddly enough, in the last sentence, he seems to strike the nail on the head. The estimation of size is a matter of experience which is the combination of two factors, namely, the size of the retinal image and the

distance at which the object is placed. In a limited sense our perception of magnitude depends upon the size of the retinal image, but our consciousness of magnitude is not thus conditioned. In other words, a given size of retinal image does not always give rise to the sensation of an equal magnitude. Thus, a huge object such as a tower will, at a certain distance from the human eye give the same size of retinal image as a six foot rule, held at a nearer distance.

Yet we know that a six foot rule is not equal in size say to the tower of the University, although at different distances the retinal images are of similar dimensions. The sensations got from the size of a retinal image is mentally corrected, and it is mentally corrected very largely although not entirely by the estimation of distance. The apparent size of an object then, is conditioned by the size of the retinal image, and conditioned by the distance of the object from the person who sees it.

But Berkeley misses, all but entirely, the most important function of vision, namely, that property to which we give the name of visual acuteness. Without visual acuteness, as already stated, man would be unable to read or to write, and would be much curtailed in his energies. The only reference which is made to something like visual acuteness occurs in the 83rd paragraph.

"The visive faculty, considered with reference to its immediate objects, may be found to labour of two defects: first, in respect of the extent or number of visible points that are at once perceivable by it, which is narrow and limited to a certain degree. It can take in at view but a certain determinate number of *minima visibilia*, beyond which it cannot extend its prospect. Secondly, our sight is defective in that its view is not only narrow, but also for the most part confused; of those things that we take in at one prospect, we can see but a few at once clearly and unconfusedly; and the more we fix our sight on any one object, by so much the darker and more indistinct shall the rest appear."

Almost within our own time Professor Snellen of Utrecht tried to define the smallest object that could be seen, and on his researches founded those test-types which are all but universally used as a measure of visual acuteness. Unfortunately they have come to be regarded as an absolute standard instead of being, as they are, only an extremely useful comparative one, and the normal visual acuteness of mankind has not yet been determined.

Let us briefly illustrate what is meant by visual acuteness. If anyone take a page of print and look at a word about the centre of the page he will at once observe that while he looks steadfastly at the selected word he is unable to see almost any other word on the same page at the same moment; possibly if there are one or two small words in juxtaposition he will be able to make out those immediately next to the one which he has selected, but the rest of the page will be to him at the moment entirely illegible.

As is well known this function which we have called visual acuteness is the special property of that part of the retina which is known as the *macula lutea* and extends to only a very small angle round the point of fixation. It is commonly called the form sense, which seems to me in great part a misnomer, for, if a person look at one part of a wall he will be at the same time aware of the form of objects placed at a considerable distance from his fixation point. Thus, to take a concrete example, if any member of my audience gaze fixedly at the chair placed immediately behind me, he will be conscious at the same time that the clock high up on the wall is circular. He will also be aware of the shapes of many other objects situated in the room.

Probably this faculty depends upon the light sense rather than on the visual acuteness, but still the fact remains that the sense of form in this wider acceptation of the term, belongs to the entire field of vision and is not restricted to the area of the macula. I prefer to use the definite term visual acuteness for that special function of the macula by which mankind is enabled to read small type and probably also to write. So far as the eye is concerned, it depends on the *macula lutea*, and there is every reason to believe that certain portions of the *occipital cerebral cortex* have to do with this special function.

Further, there is much evidence to prove that unless the visual acuteness is developed in early life it remains in abeyance. It is a matter of common notoriety that if in the first two or perhaps even three years of life a child begins to squint constantly with the same eye, that when maturity comes it will be found that the squinting eye is possessed of almost no visual acuteness at all. Donders of Utrecht was amongst the first to point out this fact and to emphasise it. He called this want of vision in the squinting eye *amblyopia exanopsia*, by which he meant blindness from want

of use. Now his explanation of the phenomenon was briefly as follows :—

He said that, if an arm were bandaged long enough, it became comparatively useless, so also, he said, in a similar way, if an eye was not used for purposes of vision it became blind or at anyrate lost its sense of acuteness. The facts must be admitted, but at the same time the analogy does not hold. The arm becomes powerless because the muscles undergo a certain amount of temporary atrophy and the nerves supplying them have dimished function. The eye becomes blind because it has never been taught to see. If the bandages are removed timeously from the arm it will rapidly recover its power, and probably in course of time will be as useful to its owner as ever.

An eye which in early life has not been taught to see in the sense of havi g visual acuteness, will never in after-life attain that power. The cases are not analogous. If, for example, the squinting eye is put straight, a thing which happens constantly, the rectified organ may look perfectly well and even a critical examination will fail to discover by external observation that there is anything the matter. Yet vision in the sense of visual acuteness will never be gained by that organ. A few phenomena in this connection are well worth considering. Occasionally it happens that ordinary functional squint does not set in till after the patient is five or more years of age ; in other words, till good visual acuteness has been developed. Here it is found that in after-life, although the eye may have been allowed to deviate for a considerable time, still it never loses its visual acuteness, and that if the defect be remedied it at once becomes useful for vision. A still more striking example is obtained in that malady which is known as senile cataract. An eye may lose its vision by an opacity of the lens after it has served its owner for many years. If the cataract be successfully removed it is found that the visual acuteness has not been interfered with even by a prolonged period of inactivity.

In the case of the young child who begins to squint before the completion of his third year, it has recently been shown that the eye can be saved from impending *amblyopia*. The remedy is simplicity itself. All that has to be done is to make the child, by appropriate means, use the right eye and the left eye alternately, and in this way both eyes become possessed of ordinary visual acuteness. It is perhaps not wide of the mark to infer that when

amblyopia is found, it is abundantly explained on the supposition that the brain centres connected with visual acuteness for the squinting eye have never been developed at what may be called the formative period of the brain, and cannot be evolved at a later period. If, therefore, a child be compelled to use each eye alternately, then the brain centres in connection with each eye will be duly developed and the *amblyopia* avoided.

The most interesting cases are those in which in early infancy that form of lenticular opacity is found which is called congenital cataract. In a very large majority of cases the opacity does not affect the whole lens but only a portion of it, and thus parts which are still transparent are useful for vision. Probably the opacity in these cases interferes but slightly with the formation of a good image on the retina.

Thus, if an ordinary convex lens be taken and the major portion of its surface covered with some opaque substance such as a piece of paper, then it will be found that the remaining transparent part of the lens gives a perfectly definite image of any suitable object. Those who are familiar with the facts of spherical aberration will not be in the least surprised at this result. So far as the unaided eye can observe, the image given by a lens which has been in great part covered by an opaque object, is equally definite with that furnished by a lens which has not been in this way partially obstructed. There may be a difference in brilliancy but there is no loss in definition. In an almost insignificant minority of cases of congenital cataract the opacity is so extensive as to make the whole lens opaque, and consequently if both eyes are similarly affected then their owner is what may be called blind. He has no other visual sensations than those of luminosity. Luminous sensations exist independently of visual acuteness and form sense. Thus, if a person shuts his eyes and looks towards a window or other source of light, and passes his hand between himself and that source, then he is conscious, even through the shut eyelids, of the passage of the hand or other opaque object.

Differences of luminosity can thus be perceived through shut eyelids and probably are more easily distinguished through cataractous lenses for they are not so opaque as an eyelid. Take one of the rare cases of a child with congenital cataract so opaque that it is practically blind. The question arises, if by simple surgical procedure these opaque lenses are removed, will the child

see in the sense of having visual acuteness? So far as I am aware the answer must be in the negative. I know of no case on record where a person blind from congenital cataract, and who has been allowed to remain so by the inadvertence or carelessness of his parents or guardians till he has attained adolesence, ever had sight restored to him in the sense of being able to read ordinary type. Twice in my lifetime I have had such patients under my charge. In both of them ordinary surgical procedure was successful in perfectly removing the opaque lenses, and yet neither of them have ever been able to read ordinary type, and neither of them was mentally deficient. One of them had an extremely good scholastic career and mentally was above the average. He went to a school for the blind after the lenses were removed and had an entirely satisfactory course there. The other is a musician and although the opacities have been completely removed she is not able to be taught to read the notes of music. Yet she is quite able to come from her home near Dalmuir to see me in Glasgow without anyone to guide her.

The range of observation is of course limited, for the condition involved is extremely rare; yet I repeat that I am not aware of any patient who has had such an amount of blindness as to prevent in all the early years of life the visual acuteness being developed acquiring the power to read ordinary type. One other somewhat analogous condition obtains. A young child being left like its first parents to the freedom of its own will, offers, as may be most convenient at the time, either its left or its right hand to a stranger to shake. I have observed also a child to take a spoon either in the right hand or in the left hand as at the moment seemed to it most suitable. A stupid prejudice has made it the custom to forbid its doing so. A parent will direct the child to use the proper hand, consequently the infant is prevented from becoming ambidextrous. During the period of infancy and childhood means should be taken to compel a child to use its right hand and its left hand alternately, for if it did so at that period of life at which the brain functions are being developed, then the child would have the great advantage of being ambidextrous throughout life.

Lastly, do such views as we have been explaining shut us up to the old crude materialism of 30 or 40 years ago? Far from it. Do they not rather show that that subtle influence which we call

mind, in early life lays down those centres of the brain which in after life it is going to use? This is not the place, nor have I the time to take up at the tail end of an address such as this, a criticism of the old materialistic doctrine, but the more one studies the philosophy of sight the more one sees the necessity of predicating intelligence behind mechanism. A most interesting pamphlet on this aspect of vision is that of Laugel, entitled "Optics and Art." If I have not wearied you, and if I may again tresspass on the boundless good nature which I have found so prevalent in this Society ever since I became officially connected with it, I may at some future time digest that most interesting monograph for your benefit.

Since preparing this address I have had interesting details of one of the two patients whose cases I have specially mentioned; namely, that of the student. Not only was his career at the school excellent, but he afterwards became a brilliant student in the University of Edinburgh. Unfortunately, he has passed over to the great majority, but at the time of his death he was engaged preparing for his University degree with honours in Mental Philosophy. Surely there was no lack of intelligence there, and yet he was not able to be taught to read. It is true that he could see in a certain way. He could see a piece of paper lying on a table, or other similar objects, and could even read large letters such as are used in bills on the street. In other words, he had just that amount of sight which depends upon the light sense, but he had not, in any degree, that function to which the name of visual acuteness is properly applied. Such persons seem to have those powers of vision which depend upon the light sense and upon no other.